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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/578,644	05/09/2006	Peter Klaus Bachmann	DE 030388	1509
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EXAMINER SWANSON, WALTER H				
ART UNIT 2823		PAPER NUMBER		
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/578,644

Applicant(s)

BACHMANN ET AL.

Examiner

WALTER H. SWANSON

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 May 2006.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-18 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 09 May 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-8508)
Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____

DETAILED ACTION

Priority

Acknowledgment is made of applicants' claim for foreign priority based on an application filed in European Patent Office (EPO) on 13 November 2003. It is noted that applicants have filed a certified copy of said application as required by U.S.C 119, which papers have been placed of record in the file.

Continuity Information

10/578,644 filed 9 May 2006 is a national stage entry of PCT/IB04/52306 International Filing Date: 4 November 2004.

Oath/Declaration

Acknowledgment is made of applicants' declaration filed on 9 May 2006.

Specification

The title of the invention is not descriptive (device method product process structure no longer claimed). A new title is required that is clearly indicative of the invention to which the claims are directed (see MPEP § 606.01). The following title is suggested:

ORGANIC LIGHT EMITTING DEVICE WITH PROTECTIVE BARRIER LAYER
COMPRISING MODIFIED AMORPHOUS CARBON

The specification has been checked to the extent necessary to determine the presence of all possible minor errors. However, the applicants' cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

Claims 11 and 18 are objected to because of the following informalities:

Claim 11 recites: “An electronic device according to claim 6, wherein the interlayer comprises a polymer” In claim 6, a limitation involving an interlayer does not exist.

Claim 18 recites: “..., characterized in that the operating point of the deposition”
Sufficient antecedent basis does not exist.

Claim 12 is objected to because it depends from claim 11.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 13, 14, and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Motomatsu (Japanese Laid-Open Patent Publication No: 2000-133440; hereinafter, “**Motomatsu**”).

Regarding claim 1:

Motomatsu discloses an electronic device comprising a protective barrier layer stack comprising a first barrier layer of a first amorphous carbon modification (7) and a second barrier layer (8) of a second amorphous carbon modification (FIG. 2).

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【図2】

8: 第2のカーボン保護膜
7: 第1のカーボン保護膜
6: アモルファス炭素膜



No.

KEY TO FIGURE 2

- 6 Second Carbon Protective Barrier Film
7 First Carbon Protective Barrier Film
8 Organic Electroluminescent Layer

Thus, Motomatsu anticipates this claim.

Regarding claim 2:

Motomatsu discloses an electronic device according to claim 1, wherein the electronic device is an organic electroluminescent device (FIG. 1).

【図1】

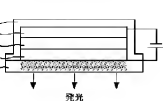
5: DLC 保護膜
(100 Å 以下)

4: 陰極

3: 有機EL層

2: 陽極

1: ガラス基板



No.

KEY TO FIGURE 1

- 1 Glass Substrate
2 Cathode
3 Organic Electroluminescent Layer
4 Anode
5 DLC Protective Barrier Film (100 Å or less)

Thus, Motomatsu anticipates this claim.

Regarding claim 3:

Motomatsu discloses an electronic device according to claim 1, wherein the first (7) and the second (8) amorphous carbon modification are selected from the group of amorphous carbon modifications comprising amorphous carbon, tetrahedral amorphous carbon, hydrogenated amorphous carbon, tetrahedral hydrogenated amorphous carbon, diamond-like-carbon, and glassy carbon (col. 5, [0019]-[0020]).

Thus, Motomatsu anticipates this claim.

Regarding claim 13:

Motomatsu discloses an electronic device according to claim 1, comprising an adhesion layer between the first barrier layer of a first amorphous carbon modification and the electroluminescent diode (col. 6, [0022]).

Thus, Motomatsu anticipates this claim.

Regarding claim 14:

Motomatsu discloses an electronic device according to claim 1, comprising a top layer lying on and in contact with the second barrier of a second carbon modification (col. 6, [0023]).

Thus, Motomatsu anticipates this claim.

Regarding claim 16:

Motomatsu discloses a method of manufacturing an electronic device comprising an electroluminescent diode and a protective barrier layer stack comprising a first barrier layer (7) of a first amorphous carbon modification and a second barrier layer (8) of a second amorphous carbon modification, wherein the first (7) and the second (8) protective barrier layer are deposited from the gas phase (col. 4, [0014]).

Thus, Motomatsu anticipates this claim.

Claim Rejections – 35 USC § 103

The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicants are advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 5-9, 12, 15, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Motomatsu.

Regarding claim 5:

Motomatsu discloses a DLC protective barrier film composed of multiple amorphous carbon modification barrier films.

Motomatsu is **silent** regarding the plasmon energy of the amorphous carbon modification barrier films.

However, notwithstanding, one of ordinary skill in the art would have been led to the recited dimensions through routine experimentation and optimization. Applicants have not disclosed that the dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the process would possess utility using another dimension. Indeed, it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical.

Regarding claims 6-9:

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See claim 5.

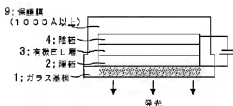
Regarding claim 12:

Motomatsu discloses the claimed invention except for the second amorphous carbon modification comprising at least 10 % hydrogen bound to the carbon atoms. It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the second amorphous carbon modification comprising at least 10 % hydrogen bound to the carbon atoms, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233 (CCPA 1955).

Regarding claim 15:

Motomatsu discloses an electronic device as claimed in claim 1, characterized in that the layer thickness of the barrier layer stack $d > 30$ nm (Prior art of Motomatsu discloses a barrier layer stack $d > 100$ nm, FIG. 5).

【図5】



- No. KEY TO FIGURE 5
- 1 Glass Substrate
 - 2 Cathode
 - 3 Organic Electroluminescent Layer
 - 4 Anode
 - 9 Protective Barrier Film (1000 Å or more)

Motomatsu discloses the claimed invention except for the lesser end of the barrier layer stack thickness range of $d > 30$ nm. It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the lesser end of the barrier layer stack thickness range at $d > 30$ nm, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine

skill in the art. *In re Aller*, 105 USPQ 233 (CCPA 1955). A *prima facie* case of obviousness typically exists when the ranges of a claimed composition overlap the ranges disclosed in the prior art. E.g., *In re Geisler*, 116 F.3d 1465, 1469, 43 USPQ2d 1362, 1365 (Fed. Cir. 1997); *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936-37 (CCPA 1976); *In re Malagari*, 499 F.2d 1297, 1303, 182 USPQ 549, 553 (CCPA 1974).

Regarding claim 17:

Motomatsu discloses a method of manufacturing an electronic device as claimed in claim 15, characterized in that the protective layer is deposited by means of a RF plasma CVD process (col. 4, [0014]).

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Motomatsu in view of Murazaki *et al.* (Japanese Laid-Open Patent Publication No: 2003-178867 A; hereinafter, “**Murazaki**”).

Regarding claim 4:

Motomatsu is **silent** regarding doped amorphous carbon modifications, wherein the dopant is selected from the group of boron, silicon, nitrogen, phosphorus, oxygen, and fluorine.

Murazaki **teaches** doped amorphous carbon modifications, wherein the dopant is selected from the group of boron, silicon, nitrogen, phosphorus, oxygen, and fluorine (col. 2, [0011], Table 1).

【表 1】

	保護膜	
	膜厚 (nm)	Si 含有量 (%)
試料 1	50	0
試料 2	200	0
試料 3	200	0.1
試料 4	200	60
試料 5	200	2
試料 6	20	15
試料 7	50	15
試料 8	200	15
試料 9	1000	15
試料 10	200	20

[Table 1]

KEY TO TABLE 1
PROTECTIVE BARRIER FILM

	Film Thickness (nm)	Si Concentration (%)
Sample 1	50	0
Sample 2	200	0
Sample 3	200	0.1
Sample 4	200	60
Sample 5	200	2
Sample 6	20	15
Sample 7	50	15
Sample 8	200	15
Sample 9	1000	15
Sample 10	200	20

It would have been obvious to one of ordinary skill in the art to modify Motomatsu by doping amorphous carbon modifications, wherein the dopant is selected from the group of boron, silicon, nitrogen, phosphorus, oxygen, and fluorine as taught by Murazaki. This is so because compared to undoped DLC protective barriers, doped DLC protective barriers have superior adhesive and protective properties (see Murazaki col. 2, [0011]). Furthermore, it would have been obvious because all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded predictable results to one of ordinary skill in the art at the time of the invention. *KSR International Co. v. Teleflex Inc. (KSR)*, 550 U.S. ___, 82 USPQ2d 1385 (2007). “If a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond that person’s skill.” *KSR International Co. v. Teleflex Inc. (KSR)*, 550 U.S. ___, 82 USPQ2d 1385 (2007).

Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Motomatsu in view of Jones (US 5,920,080; hereinafter, “**Jones**”).

Regarding claim 10:

Motomatsu is **silent** regarding an interlayer between the first barrier layer of a first amorphous carbon modification and a second barrier layer of a second amorphous carbon modification.

Jones **teaches** an interlayer (545, 546) between the first barrier layer (542) of a first amorphous carbon modification and a second barrier layer (541) of a second amorphous carbon modification (FIG. 7).

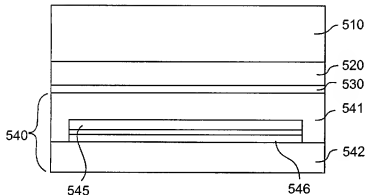


FIG. 7

It would have been obvious to one of ordinary skill in the art to modify Motomatsu by forming an interlayer between the first barrier layer of a first amorphous carbon modification and a second barrier layer of a second amorphous carbon modification as taught by Jones. This is so because getter material layers such as dielectrics Si_3N_4 , SiO , and SiO_2 , are capable of removing moisture (see Jones col. 10, lines 6-17). Furthermore, it would have been obvious because all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded predictable results to one of ordinary skill in the art at the time

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of the invention. *KSR International Co. v. Teleflex Inc. (KSR)*, 550 U.S. ___, 82 USPQ2d 1385 (2007). “If a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond that person’s skill.” *KSR International Co. v. Teleflex Inc. (KSR)*, 550 U.S. ___, 82 USPQ2d 1385 (2007).

Regarding claim 11:

An electronic device according to claim 6 [*sic*], wherein the interlayer comprises a polymer selected from the group of parylenes, benzocyclobutanes, polyimides, fluorinated polyimides, poly(arylene ethers), poly(naphthalenes), poly(norbornes), fluoropolymers (e.g. PTFE), chlorofluoropolymers(PCFP), and hydrocarbons. Motomatsu discloses the limitations noted above but is **silent** regarding this limitation. For purposes of examination, claim 11 has been interpreted as depending from claim 10.

Jones discloses the claimed invention except for forming an interlayer comprising a polymer selected from the group of parylenes, benzocyclobutanes, polyimides, fluorinated polyimides, poly(arylene ethers), poly(naphthalenes), poly(norbornes), fluoropolymers (e.g. PTFE), chlorofluoropolymers(PCFP), and hydrocarbons. It would have been obvious to one having ordinary skill in the art at the time the invention was made to form an interlayer comprising a polymer selected from the group of parylenes, benzocyclobutanes, polyimides, fluorinated polyimides, poly(arylene ethers), poly(naphthalenes), poly(norbornes), fluoropolymers (e.g. PTFE), chlorofluoropolymers (PCFP), and hydrocarbons; since it has been held to be within the general skill of a worker in the art to select a known material on the

basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416 (CCPA 1960).

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Motomatsu in view of Hasegawa *et al.* (Japanese Laid-Open Patent Publication No: 2003-109753 A; hereinafter, “**Hasegawa**”).

Regarding claim 18:

Motomatsu is **silent** regarding a method of manufacturing an electroluminescent device as claimed in claim 15, characterized in that the [*sic*] operating point of the deposition from the gas phase lies in the kinetically controlled range.

Hasegawa **teaches** a method of manufacturing an electroluminescent device characterized in that an operating point of a deposition from a gas phase lies in a kinetically controlled range (cols. 2-3, [0008]-[0010]).

It would have been obvious to one of ordinary skill in the art to modify Motomatsu by depositing from the gas phase within a kinetically controlled range as taught by Hasegawa. This is so because the resulting gas barrier has improved protection properties (see Hasegawa col. 3, [0010]). Furthermore, it would have been obvious because all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded predictable results to one of ordinary skill in the art at the time of the invention. *KSR International Co. v. Teleflex Inc.* (KSR), 550 U.S. ___, 82 USPQ2d 1385 (2007). “If a technique has been used to improve one device, and a person of ordinary skill in the art would recognize

that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond that person's skill." *KSR International Co. v. Teleflex Inc. (KSR)*, 550 U.S. ___, 82 USPQ2d 1385 (2007).

Claims 1-18 are rejected.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicants' disclosure. The references listed on the attached Form PTO-892 are cited to show various methods of forming organic light emitting devices with protective barrier layers formed from Diamond Like Carbon (DLC). References disclosing organic light emitting devices having protective barriers composed of three or more modified amorphous carbon layers are included. In short, these references generally contain structures and methods similar to that of the current invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Walter H. Swanson whose telephone number is (571) 270-3322. The examiner can normally be reached on Monday to Thursday from 8:00 to 17:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S. Smith can be reached on (571) 272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Walter H. Swanson/

21 July 2008

/Hsien-ming Lee/

Primary Examiner, Art Unit 2823